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AUTHOR	Kennedy, Susan L.; And Others
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ABSTRACT

The purpose of this study was to evaluate cognitive growth of elementary school students (K-6) in an integrated dental health education program. The project was initiated by the Rural Dental Health Program in a rural Pennsylvania community. The sample population of the research project consisted of 1,917 students from nine elementary schools in the project school district. A pre-test/post-test design was selected for the study. The curriculum consisted of approximately ten lessons developed specifically for each grade level. Dental health education was introduced by a broad fields curriculum in order to stimulate the motivation of the child by grouping subject matter into real life patterns. Its orientation focused on the sequential stages of human development including social, psychological, physical, motor, visual-perceptual, cognitive and language development. A control group received dental health education in a traditional direct-teaching approach, using the dental health content of a popular elementary health education textbook series. The following conclusions were drawn from this study: (1) an integrated dental health curriculum exerts a positive effect on dental health knowledge of students in grades kindergarten through six when they have been exposed to the curriculum; and (2) students in sixth grade exposed to an integrated dental health curriculum achieve statistically significantly greater gains on dental health knowledge tests than students exposed to a direct-teaching pattern of organization for dental health education. Recommendations for further research are made. (JD)

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COGNITIVE EFFECTS OF AN INTEGRATED DENTAL HEALTH EDUCATION CURRICULUM ON ELEMENTARY SCHOOL STUDENTS - PRELIMINARY FINDINGS

Susan L. Kennedy, M.S., Health Educator

Michael P. Eriksen, Sc.M., Health Educator

Patricia P. Cormier, Ed.D., Coordinator

Educational Services Division

Rural Dental Health Program

University of Pennsylvania

School of Dental Medicine

Field Office: Juniata High School

Mifflintown, PA 17059

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PURPOSE

The purpose of this study was to evaluate cognitive growth of elementary school students (K-6) in an integrated dental health education program. The null hypothesis was stated as follows:

H_0 There will be no differences in dental health knowledge between the students experiencing the integrated dental health curriculum and those experiencing the traditional mode of dental health instruction.

REVIEW OF THE LITERATURE

One of the major problems encountered by elementary teachers and administrators is an ever-expanding curriculum with less and less room for health education.[1,2] Direct teaching, correlation and integration as patterns for organizing health education have been referred to in numerous health education methodology textbooks and papers.[3,4]

In some of the literature, direct teaching has been applauded as the most successful pattern for organizing health instruction. According to Fine, "When health is not the primary focus, it may be passed over or given little attention in deference to the areas of primary concern, whether mathematics, science, english, social studies or some unifying theme".[2]

A review of the literature reveals the following major studies and results on this subject. A study by Bechtel (1937) was made to determine how many of 251 general health topics could be taught by correlation.[5] Bechtel found that forty-six (46) could be taught adequately and 117 could be taught partly by correlation. Meier (1951) surveyed health areas frequently treated in general science textbooks.[6] Using a list of 931 health concepts developed from a review of health textbooks and courses of study, the researcher found that 377 of the concepts were frequently found in science textbooks.

Gmur (1959) investigated the effectiveness of different curriculur patterns for health instruction (correlation, core course, direct teaching) in three California high schools.[7] Statistically significant differences in pre-test/post-test scores on the Le Maistre Health Behavior Inventory were demonstrated only for students receiving direct instruction. Discussion by the author indicated that, in all probability, health instruction emphasis was unequal in these three modes. Witham (1960) tested seniors in sixth (60) Minnesota high schools with the Kilander Health Knowledge Test.[8] Test scores of 1201 subjects receiving direct instruction and 895 subjects taught by correlation were analyzed. Findings indicated that direct instruction was significantly "superior" and that correlated instruction was least effective.

Jensen (1958) compared direct instruction with correlation in two sixth grade classes.[9] He found that all subjects in both groups made consistently significant gains. Comparison of direct teaching and correlation treatments did not reveal statistically significant differences among classes studied. It is important to note that this study was the only reference made to different organizational patterns in the elementary school. It is also the only one in which the integration-correlation methods scored as successfully as direct teaching. There may be a number of reasons as to why this may have occurred.

The following example of correlation is proposed in Goodlad (1966): "Art - Application of design principles to posters promoting important ideas about health and safety."[10] Many times curricula are identified as integrated, but are not. If this simplistic idea is considered health education, there is no means for a true evaluation. Objectives for both health and the academic curriculum must be considered. Rather than concluding that correlation and integration are ineffective patterns for health instruction, more research needs to be conducted, particularly through comparative studies that will supply evidence to health educators in implementing functional health instruction programs.

According to Creswell and Stauffer[11], "Criteria for determining effectiveness of the students' health education includes observation of students health behavior, their level of health knowledge as revealed in test scores, self-reported responses to attitude scales, and patterns of behavior."

Although relatively little evidence exists that health knowledge has any effect on behavior, studies by Williford, John, Muhler and Stoakey[12] (1967) have demonstrated a positive relationship between health knowledge and behavior when "dental I.Q." was measured against an oral debris index. In the majority of cases, the debris index improved with a rise in "dental I.Q.". However, a calculus index showed no improvement with "dental I.Q." and, in some cases, a negative relationship existed. Pavlid[13] (1968) and Rountree[14] (1961) both claimed that knowledge had little, if any positive effect on behavior, but did admit that some dental knowledge was needed to promote positive health values and subsequently, health beheviors. According to Cornacchia[3] (1974), "... although the ultimate goal is the direction of desirable health practices, pupils must acquire certain knowledge that will favorably influence health practices. Therefore, there are numerous inherent values in placing an estimate on the pupils' educative growth regarding health knowledge".

Recent tests for assessing dental health knowledge are sparse. Instruments such as those which evaluate specific curricula i.e., "Learning About Your Oral Health: Level II",[15] were found to be too curriculum specific. There are virtually no dental health knowledge tests for kindergarten and first grade.

METHODOLOGY

Subjects

The Rural Dental Health Program is a three-year dental health research project involving two-thousand school children, ages 5-13 years, in a rural Pennsylvania community. Project design included five of nine elementary schools in the project school district being randomly assigned to receive the integrated dental health education curriculum (N=1000). The four remaining schools (N=1000) were

identified as controls.

Procedures

The curriculum consisted of approximately ten (10) lessons which were developed specifically for each grade level, kindergarten through sixth. Lessons were developed by project staff with assistance from the program's Teacher Advisory Board to the project. This advisory board consisted of teachers representing all grades and subjects in the experimental schools. These lessons were designed to be integrated into existing academic curriculum including mathematics, science, social studies, english, reading and spelling. The curriculum was designed to be conceptual, multi-sensory, innovative, self-pacing and sequential. Dental health education was introduced by a broad fields curriculum in order to stimulate the motivation of the child by grouping subject matter into real life patterns. In addition, the curriculum was characterized by a developmental approach. Its orientation focused on the sequential stages of human development including social, psychological, physical, motor, visual-perceptual, cognitive and language.

In-service workshops were held during the year prior to the initiation of the curriculum as well as immediately prior to and during the academic year of implementation so as to assure teachers understood the philosophy, goals, objectives, dental health content, methodology and materials contained in the curriculum. Each teacher received a copy of lesson plans, developmental tasks, philosophy and supplemental materials at the workshop scheduled just prior to the opening of school, 1976. Upon request of the teacher, lesson materials and assistance were provided for the integrative points in her/his class. Concommitant to the curriculum, students in the experimental schools participated in a daily oral hygiene activity in the classroom.

The control group received dental health education in a traditional direct-teaching approach. This curriculum was defined by the dental health content of a popular elementary health education textbook series.

Fourteen parallel forms for Dental Health Knowledge Tests (Grades Kindergarten through Six) were developed, piloted and subsequently revised for use in evaluating the dental health curriculum. As of the Spring 1976 test administration, the Kuder-Richardson formula 20 yielded reliability coefficients ranging from 0.70 (Form 3A) to 0.84 (Form 5A).

The test responses for kindergarten through third grade were marked directly in the test booklet by the students and then transferred by hand to Optical Scanning Sheets. In grades four, five and six, students marked their responses directly on Op-Scan sheets. These answer sheets were visually scanned and "cleaned" by the researchers. The "clean" data sheets were submitted to Optical Scanning Equipment for the purpose of transferring student responses to IBM cards for subsequent processing by the Center for Research in Evaluation and Measurement (CREM) at the University of Pennsylvania.

A pre-test/post-test design was selected for the study. Although random assignment of students in individual classes to experimental and control groups was not possible, schools had been randomly assigned to these categories thereby suggesting equivalence of groups.

Significance for the study was set at the .05 level. Statistical analysis included t-tests of significance between the mean gain scores of experimental and control groups.

RESULTS

The sample population consisted of 1917 students from nine elementary schools in the project school district. There were 966 students from the five schools in the experimental group and 951 students

from the four schools in the control group.

Preliminary analyses of mean gain scores, calculated from the difference between mean pretest scores and mean post-test scores for schools demonstrated that although the experimental schools consistently had higher mean gain scores than the control schools the sixth grade was the only grade in which the gain was of statistical significance at the .05 level.

(INSERT TABLE I)

DISCUSSION

Summary

The purpose of this study was to assess the cognitive effects of an integrated dental health curriculum on elementary school students.

The level of significance for the study was set at .05. No significant differences were observed between mean gain scores of experimental and control groups in grades Kindergarten through Five. Significant differences were found between mean gain scores of experimental and control groups in grade six.

Conclusions

As a result of this study the following conclusions may be drawn:

1. An integrated dental health curriculum exerts a positive effect on dental health knowledge of students in grades kindergarten through six when they have been exposed to the curriculum.

2. Students in sixth grade exposed to an integrated dental health curriculum achieve statistically significantly greater gains on dental health knowledge tests than students exposed to a direct-teaching pattern of organization for dental health education.

Recommendations

The following recommendations are offered as a result of this study:

1. Continued analysis of test scores for future academic years should be undertaken. These will yield results relative to gains made by students experiencing maximal exposure to the curriculum (i.e., Kindergarten, Grade One, Grade Two and so on).

2. As the integrated curriculum is teacher-initiated, analysis should be made of classes identified as being taught by "high-utilizer" teachers, "low-utilizer" teachers and teachers utilizing a traditional dental health curriculum.

3. Future implementation of the dental health curriculum and evaluation using the Dental Health Knowledge Tests in a variety of settings should be undertaken in order to establish generalizability and reliability of the findings.

Table I

Gain Scores for Pretest and Post-Test by Experimental and Control Groups as Analyzed by t-tests

	N[a]	$\bar{X}$	standard deviation	t[b]
Kindergarten				
Experimental	5	10.39	4.60	-0.20
Control	4	9.92	1.09	
Grade One				
Experimental	5	2.42	3.47	-0.31
Control	4	1.76	2.68	
Grade Two				
Experimental	5	10.76	4.03	-1.05
Control	4	5.66	10.06	
Grade Three				
Experimental	5	6.45	4.68	-1.22
Control	4	3.38	1.88	
Grade Four				
Experimental	5	3.94	1.01	-1.84
Control	4	1.94	2.19	
Grade Five				
Experimental	5	4.09	0.75	-0.64
Control	4	3.66	1.27	
Grade Six				
Experimental	5	3.16	1.15	-2.44[c]
Control	4	1.57	0.65	

[a] N = number of elementary schools

[b] df = 7 for all groups

[c] -2.44 = p.05

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